

SECTION 1 INTRODUCTION TO SHOP AND TOOL SAFETY

While tools help us to be more efficient, they must be used with caution. Tool safety can be achieved in a variety of ways which include safe work practices, tool guarding, protective equipment, and tool maintenance. Specific safety practices exist for different tools.

Whether the tool is powered by electricity, gasoline, compressed air, or by hand, safety must be foremost in the mind of the user. At NHMFL a variety of tools of different types are used. This safety manual describes hazards of these tools, general safety rules which apply to tools, and specific safety rules for tools used at NHMFL. This manual does not include all tools in use at NHMFL. If you have safety concerns about any tool used at NHMFL ask your supervisor or refer to the manufacturer's instructions.

COURSE OBJECTIVES

This course will provide information concerning shop and tool safety. As a result of this training, the attendees will be able to:

- Describe general safety practices to be used when setting up a work area, selection of personal protective equipment, and utilizing tools at the work site.
- Identify hazards and state precautions taken when using electric powered tools, pneumatic powered tools, and fuel powered tools.
- Identify hazards and state precautions taken when using hand tools, portable power tools, and stationary power tools.

NOTES :

SECTION 2 GENERAL TOOL SAFETY

Though tools differ in their function, power source, and size general safety rules apply to the use of all tools. This section describes these safety rules, as well as presenting the regulations and standards which apply to tool use.

WHAT ARE THE REGULATIONS AND STANDARDS?

The Occupational Safety and Health Administration (OSHA) has established regulations that apply to electrically powered machinery, under Subpart O, Machinery and Machine Guarding, and Subpart P, Hand and Portable-Powered Tools and other Hand-Held Equipment. These regulations are found in the Code of Federal Regulations: 29 CFR 1910.211-.247.

The American National Standards Institute (ANSI) publishes standards for tool design and safeguarding, including the Safety Standard for Stationary and Fixed Electric Tools. ANSI/UL 987.

GENERAL HAZARDS OF TOOL USE

There are a variety of hazards associated with improper tool use and faulty tools. Some of these hazards are unique to the tool while others are common for many types of tools. Examples of hazards and associated injuries include the following:

- Being struck by a tool, moving machine, or moving part can cause bone fractures, concussions, and internal organ damage.

NOTES :

Are there any hazards in your shop?

What injuries could occur from these hazards?

Shop and Tool Hazards

Rotating blades, bits, chucks, lathes.

Moving equipment (pinch points).

Electrical sources.

Dusts from wood, plastics, and metals.

Flying debris (shavings, chips).

Unguarded belts, shafts, and gears.

Noise.

Ultraviolet light from welding.

NOTES :

- Did you know that the severity of an electric shock is related to the amperage and not the voltage? 6/100 of an amp can cause death if it passes through the chest!***

Tools can create noise hazards and hearing damage. Depending on the material being cut, shaped, or sanded harmful air contaminants can be produced. Tools can also become very hot or cold, causing burns.

General safety rules apply to both stationary and portable power tools. The following shop safety rules apply to many of the tools which you use:

- Your work area shall be kept clean! Oily rags, dust, and paper are fire hazards and can damage your tools. Place scrap materials in appropriate containers.

SECTION 2 GENERAL TOOL SAFETY

- Keep your work area well lit. If you can't see your work, then you can't see a hazard.
- Keep your area dry. Wet floors and work surfaces can cause slips. Water serves as an excellent electric conductor between the ground, you, and your tool!
- Before working with tools that can produce sparks, make sure that the surrounding area is free from ignitable materials.
- Know the locations of fire extinguishers. They shall be the correct type (e.g., A, B, C, D) for the potential fires which could occur in your shop. Also, know where the fire alarm is located and the proper exit route(s) for your work area.

Personal Protective Equipment

- Use protective equipment when necessary. Safety glasses and safety shoes must always be worn in the Machine Shop. Other PPE includes gloves, hard hats, hearing protection, respiratory protection, special protective clothing, and welding masks. Discuss proper safety equipment with your supervisor and the NHMFL Safety Department.
- When operating the overhead crane, hardhats, gloves, safety shoes, and safety glasses must be worn.
- Noise produced by power tools can drown out other sounds in the shop... like a person shouting "STOP!" or "HELP!" Stay alert to your surroundings.

NOTES :

Can you identify what each type of extinguisher is used for?

*Type A - Paper, wood, etc.
Type B - Flammable liquids
Type C - Electrical
Type D - Metals*

SECTION 2 GENERAL TOOL SAFETY

NOTES :

Dress for Safety!

Never work with tools if you're too tired!

- When cutting certain materials like plastics or epoxies, fumes can be released. Dust is produced when using most every shop tool. To address these potential hazards, discuss the appropriate controls and respiratory protection with your supervisor or Safety Department.

Clothing

- Never wear loose clothing or jewelry that can entangle in power tools. Hand jewelry can serve as a conductor of electricity.
- Tie back long hair.
- Do not wear neckties while working around machinery.

Tools

- Always use the right tool for the job! Forcing a small tool to do a big job causes the tool to strain. A strained tool can kickback or break, causing injury.
- Never use a tool which you are unfamiliar with. Get proper training from your supervisor, the Safety Department, or the tool manufacturer. Read the tool manual for proper use procedures and safety precautions.
- Before each use, inspect your tools. Check the alignment of moving parts, breakage of parts, and cracks.
- When you're tired, your attention span is reduced. Attention to your work is very important when working in the shop. Make sure you're fit to do the job!

SECTION 2 GENERAL TOOL SAFETY

- Disconnect the power source when performing maintenance, cleaning, or changing blades and bits.
- Be wary of dropping tools. Don't rest a tool on the edge of the workstation. Secure tools when working at heights.
- When using both portable and stationary tools, grip the tool or material being worked-on firmly. Hold tools only by insulated grasping surfaces. The material being worked-on should be well secured.
- Make sure that you are well balanced when operating a tool. Sometimes, a "kickback" from a tool can throw the operator off balance, causing injury. Don't work in an awkward position. You may not have complete control of the tool or the material you are working on.
- Never lock a tool in the ON position if you are working under conditions which require you to stop the tool quickly.
- Guarding is one of the best ways to minimize a hazard. Make sure that machine guards are in place on large and small equipment.
- When cutting materials, try to cut along the grain. This will reduce the chance of kickback or shattering of the material.

Maintaining and Repairing Tools

- Install or repair equipment only if you are qualified. A faulty job could cause serious injuries from mechanical failure, fire, or shock.

N O T E S :

[illegible]

SECTION 2 GENERAL TOOL SAFETY

NOTES :

- Maintain tools in proper working condition. Regularly inspect tools, cords and accessories. Repair or replace problem equipment immediately. Keep tools sharp, well oiled and stored in a dry place.
- Never alter a tool in a manner which reduces its effectiveness or safety.

ELECTRIC POWERED TOOLS: HAZARDS AND PRECAUTIONS

Grounding of portable electric tools and the use of ground-fault circuit interrupters (GFCIs) provide the most convenient way of safeguarding the operator. A ground is a connection in an electrical circuit that leads to the earth, or to a large conducting object that is at zero volts with respect to the rest of the circuit. In every type of

NOTES:

NOTES :

The Ground Fault Circuit Interrupter (GFCI) is a fast-acting device which monitors the flow of current. It monitors for any leakage of current and shuts the power down quickly. When a GFCI is used the current is shut off before a serious shock can occur. Remember, a GFCI shall always be used with electric tools. The third-wire ground of the tool will not totally protect the worker from shock.

- Check all grounding connections regularly for tightness.
- For a good connection, make sure that grounding connections are free of dirt and oil.
- Most GFCIs have a TEST feature. Test the GFCI regularly.
- If you have any doubts about the electrical safety of a tool, contact your supervisor and request an electrician to evaluate the equipment.

SECTION 3 TOOL POWER SOURCES: HAZARDS AND PRECAUTIONS

If you ever get shocked by a tool DO NOT continue to use it! Repair or replace the tool.

Extension Cords

Faulty or misused extension cords can present serious hazards. Here are some extension cord safety practices:

- Inspect cords regularly. Look for signs of stretching, insulation damage, and kinking.
- Keep cords and cables clean and free from kinks. Kinking can damage both the cord's insulation and internal wire.
- **Never carry a tool by its cord!**
- When using tools which require a third wire ground use only three wire extension cords with three-pronged, grounding plugs and three hole electric outlets. **Never cut off the grounding plug from a cord!** If you see a cord with the grounding plug missing, remove the cord from service.
- Pulling on electric cords can damage the cord insulation and cause electric sparks. Always remove the cord at the plug.
- Extension cords may present a tripping hazard. Make sure that cords are not located in walking paths or a non-trip cover is placed over cords.

NOTES:

[illegible]

SECTION 3 TOOL POWER SOURCES: HAZARDS AND PRECAUTIONS

NOTES :

Did you know that air from a compressed air hose can puncture your skin?

- Always use the correct extension cord for the job. An undersized cord can cause a drop in tool power and overheating. Consult the cord manufacturer's recommendations for cord length and gauge.

PNEUMATIC POWERED TOOLS: HAZARDS AND PRECAUTIONS

Pneumatic tools are tools powered by compressed air at pressures of up to 90 psi. Pneumatic impact tools include riveting guns, nail guns, chipping hammers, and jackhammers. Here are some important safety rules to remember when using pneumatic-powered tools:

- The air hose presents hazards similar to electrical cords. The hose can be a tripping hazard so it must be kept out of the way or protected. The hose must be kept clear from the work to prevent damage from the tool. If a hose gets cut and is pressurized, it can whip around and cause injury. A short length of chain attached to the tool and hose can prevent this if the hose coupling breaks.
- Care must be taken to always use hose built for the pressure involved. There have been instances where workmen have put a hand over a pinhole leak and had air forced into a finger by the high pressure.

SECTION 3 TOOL POWER SOURCES: HAZARDS AND PRECAUTIONS

- Before disconnecting the air hose from the air line, make sure that the air pressure is off and any air pressure inside the line has been released. A safety check valve shall be installed in the air line at the manifold to shut-off the air pressure if a fracture occurs in the hose.
- Pneumatic percussion tools such as air hammers, riveting guns and jackhammers operate by producing heavy impacts or by rapid pulsating motion. This causes a great deal of vibration. Rubber hand grips, air cushion devices, and vibration dampers shall be used where possible.
- Air operated staplers and nailers can cause injury by the accidental firing of the fastener. The fastener can travel at very high velocity and can easily puncture tissue from a good distance. Never point a nailer or stapler at another person. Always be aware of where the fastener is going when you activate the tool.
- In the use of pneumatic chipping tools there is a hazard from flying chips. Operators should wear safety goggles, and, if other employees must be in the vicinity, they be similarly protected. If two employees are chipping in the same area, they shall work back to back so they are chipping away from each other.
- Noise levels from pneumatic tools are usually elevated and should be evaluated to determine if hearing protection is required. OSHA says; at 85 decibels, hearing protection should be offered to the employees, and at 90 decibels, hearing protection is required.

NOTES:

[illegible]

NOTES :

These types of tools can be powered by fuels such as propane or gasoline. The main hazards associated with fuel are flammability and combustion. Certain tools like a propane torch produce a flame, which can burn and serve as an ignition source. The following safety guidelines should be remembered when using fuel powered tools:

- Never work near a source of ignition such as a heating element, fire, or sparks.
- The Safety Committee will determine if fuel powered machinery can be allowed to be used at NHMFL and a Hot Work Permit may have to be issued. Contact the Safety Office in advance if planning to use any type of fuel powered equipment.
- Avoid working near flammable materials and fuel storage areas like paper boxes, gas and propane tanks, and flammable chemical storage areas.
- Always store fuels in a cool, protected location.
- Fuels like gasoline contain harmful chemicals like benzene. Avoid breathing gasoline vapors. Use respiratory protection if needed.

SECTION 4 HAND TOOL SAFETY

HAND TOOLS

Injuries from hand tools are often caused by misuse. Workers often assume that they know how to use a common hand tool. Like all tools, hand tools must be maintained properly for effective use and safety. This section describes general safety guidelines for the three major categories of hand tools: cutting tools, torsion tools, and impact tools.

Cutting Tools

The main hazard associated with cutting tools is tool slippage. A dull tool or poor tool technique can cause a slip, which can redirect the cutting part of the tool toward the body. In addition, a sudden release or change in the force applied to a tool can throw the user off balance, possibly falling into another object which may cause injury. To prevent slippage, tools shall be kept sharp and handled in such a way that, if a slip occurs, the direction of force will be away from the body. In addition, cutting along the grain of a material can help prevent changes in the pressure applied to the tool, thereby preventing slippage.

Torsion Tools

Torsion tools are used to grip, fasten, and turn. These include wrenches, pliers, screwdrivers, vises, and clamps. There are a variety of each type of these tools. Selection is very important. Here are a few safety precautions for common torsion tools:

NOTES :

[illegible]

SECTION 4 HAND TOOL SAFETY

NOTES :

- **Wrenches** should always be pulled and not pushed. Pushing a wrench can cause a loss of control if there is a sudden release of pressure. A short, steady pull should be used rather than quick, jerky motions. Where available, use a socket wrench instead of an adjustable or open-ended wrench. Socket wrenches are generally easier to control, are more convenient, and are less likely to damage a bolt or nut. When using an adjustable wrench, the pressure should be applied to the fixed jaw.
- **Pipe wrenches** can easily slip on pipes or fittings, causing injury. To prevent slipping, make sure that the pipe or fitting is clean and the wrench jaws are sharp and kept clean of oil and debris.
- **Pliers** should never be substituted for a wrench. They do not have the same gripping power and can easily slip on a tight object. When using cutting pliers, the object being cut can fly off and cause injury. Wear safety glasses when cutting with pliers.
- **Screwdrivers** are often misused. They should not be used for prying, as punches, or wedges. These misuses can damage the head of the screwdriver. A dull tip can cause the screwdriver to slip. The tip must be flat at the tip and tapered for a snug fit on the screw.
- When using **vises**, make sure that the vise is bolted solidly to the base. When cutting material in a vise, try to cut as close to the vise as possible. This minimizes vibration. Oil vises regularly.

Impact Tools (Hammers)

- The handle shall be securely fitted and suited for the type of job and type of hammer head. The striking face of the hammer shall be kept well dressed according to the application.
- The handle shall be smooth and free of oil to prevent slipping.
- Safety goggles shall be worn at all times when hammering to protect from flying nails, wood chips, and metal or plastic fragments.
- To properly drive a nail, hold the hammer near the end of the handle and start off with a light blow. Increase power after the nail is set.
- To avoid chipping or spalling of the hammer head, use the lightest swing possible, hammer straight and not on an angle. Inspect the head of the hammer for potential chipping and spalling.

[illegible]

NOTES :

Always keep your tools clean. Oil can cause the tool to slip off an object or out of your hands. Dirt and grime can impair the movement of the tool, requiring more pressure. This can lead to injury. In addition, wherever possible clamp the object you are working on rather than holding it in your hand. Many worker's hands have been injured from slippage of tools like screwdrivers. Furthermore, never use an uninsulated hand tool for electrical work. Finally, carry tools in a toolbox or toolbelt. Tools, especially those with sharp points or edges, carried in pockets can puncture the skin, cause bruises, and get entangled in machinery.

PORTABLE POWER TOOLS

Powered Hand Saws

- Inspect blades regularly. Make sure blades are sharp.
- Keep the saw blades clean. Buildup of material on the blade increases blade friction. This increases the chance of kickback.
- Make sure that blade guard works properly. Inspect guards frequently to make sure they rotate freely and cover the saw blade when not cutting.
- For circular saws, set the blade depth no more than 1/8 to 1/4 inch greater than the thickness of the material.

N O T E S :

NOTES :

- A circular saw shall be started and stopped outside the work. Extra care should be taken at the beginning and end of the sawing stroke to keep the body and cord away from the blade.
- Don't overload the motor by pushing too hard or cutting a heavy material with an inadequate saw.
- Never cut wet wood. Kickback may occur.
- Inspect the material to be cut before cutting. Look for nails, staples, or other foreign objects that could bind the blade or fly off during cutting.

The rotating drill bit can serve as a hazard in many ways:

- It can break and fly off.
- It can catch the material being worked on, causing the material to rotate freely and hit something or someone.
- The drill can slip and the user can be punctured by the bit.

To protect from these drill hazards, employ the following when using drills:

- Use the correct bit for the material. There are special bits for metal, wood, masonry, plastic and other materials.
- Make sure that drill bits are sharp. A dull bit causes the user to press harder on the drill and increases the chance of tool slippage or bit breakage.

SECTION 5 PORTABLE POWER TOOLS

SECTION 5 PORTABLE POWER TOOLS

- Old bits can get metal fatigue. Replace bits according to the manufacturer's guidelines.

Routers

The shaft and bit of a router can turn very fast and cut very quickly. The hazards are similar to drills but can be more severe. The safety rules listed below should be followed when using routers:

- Always start the router with the cutting edge in contact with the material to be cut.
- When the cutting is complete, turn off the router. Do not lift the router until it has come to a stop.
- The base of the router shall always be kept flat on the work surface.
- If available use a chip shield to protect from flying objects.
- Always allow the router to come to full speed before beginning to cut.

Soldering Irons

The main hazards associated with soldering irons include burns and toxic fumes. Follow these safety rules when using soldering irons:

- Resting the iron on wood or metal over wood can cause fires. The use of insulated soldering iron holders reduces the fire hazard and chance of burns from accidental contact. The holders should prevent accidental touching of the iron tip.

NOTES :

Routers operate at speeds of 20,000 RPM, which is 25 times faster than most hand drills.

SECTION 5 PORTABLE POWER TOOLS

[illegible]

- ## Glue Guns

SECTION 6 STATIONARY POWER TOOL SAFETY

STATIONARY POWER TOOLS

Many of the safety practices used for portable tools apply to stationary power tools. However, stationary tools tend to be larger, more powerful, and more complex. These factors can lead to serious injuries. Some of the safe practices which we learned in previous sections apply to stationary tools. These are reviewed below, followed by specific safety measures for a variety of stationary power tools:

- Safety devices and guards must always be in place. These devices were designed by the manufacturer to be used with the tool.
- Always keep blades and cutting edges sharp!
- Perform maintenance, accessory changes, and adjustments only when the tool is off and unplugged.
- Don't wear loose fitting clothing. High powered stationary tools can catch clothing and draw the operators body into the tool.
- When using any type of stationary saw, never use gloves. They can get caught in the saw.
- Never put your fingers and hands in front of sawblades and other cutting tools.
- Never turn or feed the material or workpiece at excessive speed. This increases stress on both the workpiece and the machine.

NOTES :

NHMFL Stationary Power Tools

Sheet Metal Benders

Table Saws

Metal Radial Arm Saws

Belt Grinders

Wheel Grinders

Drill Presses

Welders

Band Saws

Milling Machines

Lathes

Sheet Metal Shears

NOTES :

- ### ***Table Saw (Circular Saw)***

- Use the saw guard at all times. No operation shall be done with the guards removed.
- Never reach over the saw blade to remove scraps, or to provide support to the workpiece. If you are off-balance, you could fall into the saw.
- Always stand to the side of the saw, and never directly in line with the blade. If the saw catches the material you are working on, the saw will throw it in line with the blade.

SECTION 6 STATIONARY POWER TOOL SAFETY

- To prevent kickback never use a dull blade and never cut without the guide and splitter guard in place. In addition, don't drop wood on top of the saw blade.
- When cutting, NEVER PULL the workpiece through the saw. Start and finish the cut from the front of the saw.
- Never feed the workpiece from the back of the saw.
- When crosscutting, hold the workpiece firmly against the miter gauge. Make sure that the miter gage works freely in the slot and that it will clear both sides of the blade when tilted. Note that on some saws the miter gage can be used *only on one side* when the blade is tilted.
- Use a push stick according to the manufacturer's guidelines. In general, when using a push stick or push block, the trailing end of the board must be square. A push stick against an uneven end could slip off or push the work away from the fence. The fence is the stop plate or barrier used to guide the workpiece.

Radial Arm Saw

The radial arm-saw is a very versatile tool and is one of the most used tools in the shop. Because of its ability to cut a variety of ways, it presents a variety of hazards. However, if used properly it can be one of the safest tools in the shop.

NOTES :

A "Crosscut" is a cutting or shaping operation made across the grain of the wood. A "Rip Cut" (or "Ripping") is a cutting operation along the grain of the wood.

SECTION 6 STATIONARY POWER TOOL SAFETY

NOTES :

Follow these precautions when using this tool:

- Never stand directly behind or in-line with the saw. Stand to either side of the saw.
- The motor/saw assembly must be returned to the rear of the table (against the column) after each cut. Never remove the workpiece from the table until the saw has been returned to the rear.
- When crosscutting, make sure the workpiece is held against the guide fence. This will virtually eliminate kickback.
- It's easy to overload the motor of a radial arm saw. If the motor overloads, check the motor and blades. Don't feed the workpiece too quickly.
- To minimize vibration, the saw should be maintained in good alignment and adjustment.
- When lowering the blade, keep your hands and arms out of the way of the blade!
- When ripping, make sure that the blade rotates toward you and always feed the workpiece under the safety guard from the side opposite to the anti-kickback fingers. When ripping narrow stock, use a push stick to complete the cut.

Band Saw And Jig Saw (Reciprocating Saw)

Band Saw

- Always stand to the left of the band saw. In the event of a broken blade, the blade will fly off to the right. If the blade breaks, shut-off the power and stay away from the saw until it stops.
- Care should be taken in uncoiling, removing, and installing the band saw blade. Use gloves. The blade shall be adjusted and tensioned properly.
- The blade guard is very important when using the band saw and jig saw. Keep your fingers away from exposed parts of the blade.
- Follow the manufacturer's guidelines for adjustment of the sliding bar or post. If the guide is too high, the blade will not have the proper support.
- Avoid backing out of the cut. This could push the blade off the wheels.
- Never cut a small radius with a wide blade unless you make relief cuts first.

NOTES :

NOTES :

- Always install the blade with the teeth pointing down. Adjust the tension according to the manufacturer's guidelines. Turn the pulley over by hand to make sure that the blade operates properly before turning on the power.
- Do not place excess force on the jigsaw blade. It can easily break and fly off.
- Adjust the blade guide and hold down properly.

The chief hazards from wheel grinders are flying pieces of a shattered grinding wheel and being cut by the grinding wheel. Follow these precautions to avoid these hazards:

- Before each use, inspect the grinder to ensure that the grinding wheels are firmly attached and that the work rests are tight.
- Because some grinders can be converted to buffers, guards are often removed. When using the unit as a grinder, always have a guard in-place.
- Always inspect the grinding wheel before use. The wheel should be free of cracks. Grinding wheels shall be ring tested prior to installation.
- Too much pressure on the wheel can cause it to fracture. Spend more time at lighter pressure.

SECTION 6 STATIONARY POWER TOOL SAFETY

- Always use grinding discs that are marked with a rating speed above the maximum speed of the grinder. Never use an unmarked grinding wheel. Check the spindle speed before mounting the wheel.

Drill Press

Many of the safety rules of the portable drill apply to the drill press. In addition, follow these rules:

- Always secure the material being drilled.
- When lowering the press, keep your hands out of the way of the bit.
- Never use a hand or auger bit. Use bits designed only for the drill press.
- Never try to stop the machine by taking hold of the chuck after the power is off.
- Check to make sure the chuck is secured before turning the drill press on.

Lathes

The lathe is different from some of the tools presented so far. While most tools rotate or move a blade or bit to cut, the lathe moves the workpiece being cut. If the workpiece is not fastened to the lathe properly or is defective, it can fly off or break apart, causing injury. To minimize this and others, follow these safety rules:

- Stand to the side of the lathe. This will also minimize the chance of being hit by a tool if it catches.

N O T E S :

[illegible]

N O T E S :

- Always run the lathe at low speed until the workpiece is rounded.
- Check to make sure that the chuck is secured before turning the lathe on.

- Never place any body part in the blade area.
- Always check the work area around the brake. Be sure that the area is free from people.

SECTION 6 STATIONARY POWER TOOL SAFETY

- Before using the brake, check the counterweight rods and counterweights to make sure they are secure.
- Never place material in the brake which is too rigid for the capacity of the brake. Overstraining the brake can cause the arm and other parts to break and possibly cause injury.

Welding Machine

Severe burns can be caused by the high-energy arc of even the smallest of welding machines. When welding, the following precautions must be observed:

- Ideally, welding should be performed in a separate, well ventilated room with a fire-resistant flooring material. If welding is to be conducted in other areas, the area must be free of flammable materials.
- Non-flammable clothing, eye, and hand protection must be worn to protect from molten metal and hot sparks. Eye protection must provide appropriate shading according to the guidelines of the American National Standards Institute (ANSI). Consult the Safety Department for help in determining the correct shade for your operation.

Sheet Metals Shears

When using shears, follow these precautions:

- Keep fingers away from the cutting blade.
- Wear leather gloves when handling sheet metal to avoid cuts from sharp edges.

NOTES :

CAUTION

Looking at a welding arc can cause “welder’s flash”. This is caused by ultraviolet light generated by the welding. You will feel like you have sand in your eyes several hours after exposure.

NOTES :

- Secure the workpiece in a vice or clamp to the table.
- Prevent coolant from getting on the floor.
- Keep fingers from rotating cutters.
- Use appropriate feeds and speeds for the material machined.

SECTION 7 SUMMARY

SUMMARY

Remember these important points when working in the shop:

- Make sure that equipment is maintained properly. A mis-adjusted tool or a tool in poor condition can be hazardous.
- Don't be afraid to admit that you don't know how to use a tool. To learn about tool use talk to your coworkers and your supervisor, read the tool manual and craftsmen literature, and attend NHMFL or manufacturer's courses on tool use.
- Respect the tool power source. Whether the power source is electric, pneumatic, or fuel driven.
- Always keep your shop in good "working order".

Many tool accidents occur at home because safety precautions are more relaxed. Practice your tool safety knowledge at home!

N O T E S :

[illegible]